SYLLABUS

FOR

B.Sc. (Computer Science) Programme

Programme Structure

SEMESTER - I

BSCS101 : Fundamental of Computer

BSCS102 : Mathematical Foundation of Computer Science

BSCS103 : Digital Electronics

BSCS104 : Programming in 'C'

BSCSP11 : Programming in 'C'

BSCSP12 : PC Packages(Introduction to DOS & MS Office)

SEMESTER - II

BSCS201 : Data Structures using C

BSCS202 : Computer Based Numerical Techniques

BSCS203 : System Analysis and Design

BSCS204 : Operating System

BSCSP21 : Data Structures

BSCSP22 : Computer Based Numerical Techniques in C

SEMESTER - III

BSCS301 : Data Communication & Networks

BSCS302 : Probability & Statistical Techniques

BSCS303 : Web Programming

BSCS304 : Basics of Object Oriented Programming

BSCSP31 : Data Communication & Networks

BSCSP32 : Web Programming

SEMESTER - IV

BSCS401 : Software Engineering

BSCS402 : RDBMS

BSCS403 : Programming in C++

BSCS404 : Theory of Computation

BSCSP41 : RDBMS

BSCSP42 : Programming in C++

SEMESTER – V

BSCS501 : Introduction to Network Security

BSCS502 : Visual Basic

BSCS503 : Computer Based Operations Research Techniques

BSCS504 : E-Governance

BSCSP51 : Visual Basic

BSCSP52 : Computer Based Operations Research Techniques

SEMESTER VI

BSCS601 : Multimedia Application

BSCS602 : Computer Graphics

BSCSP61 : Computer Graphics

BSCSSM : Seminar

BSCSPR : Project

BSCS101 : Fundamental of Computer

Introduction to Computers: Computer hardware Components, Disk Storage, memory, keyboard, mouse, printers, monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Basic Operating System Concepts: MS-DOS, WINDOWS, Functional knowledge of these operating systems. Introduction to Basic Commands of DOS, Managing File and Directories in various operating Systems, Introduction to internet, Basic terms related with Internet, TCP/IP.

Algorithm development, techniques of problem solving, flowcharting, stepwise refinement algorithms for searching, sorting (exchange and insertion), merging of ordered lists.

Programming : Representation of integer, character, real, data types, constraints and variables, arithmetic expressions, assignment statement, logical expression; sequencing, alteration and interaction, arrays, string processing sub programs, recursion, files and pointers.

Structured programming concepts : Top down design, development of efficient programs; Program correctness; Debugging and testing of programs.

Element of a computer processing system : Hardware CPU, storage devices and media, VDU, input-output devices, data communication equipment software-system software, application software.

Programming languages : Classification, machine code, assembly language, higher level languages, fourth generation languages.

BSCS102 : Mathematical Foundation of Computer Science

Relation: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation.

Function: Types, Composition of function, Recursively defined function.

Mathematical Induction: Piano's axioms, Mathematical Induction, Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients, Asymptotic Behaviour of functions

Algebric Structures: Properties, Semi group, monoid, Group, Abelian group, properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Prepositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram.

BSCS103 : Digital Electronics

Representation of information & Basic Building Blocks: Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD), ASCII, EBCDIC and their conversion. Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer.

Basic Organization: Operational flow chart (Fetch, Execute, Instruction Cycle), Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers.

Memory Organization: Memory hierarchy, Main memory (RAM/ROM) chips), Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

I/O Organization: Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer.

BSCS104 : Programming in 'C'

Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programms. Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation. Control Statements: if-else, switch, break, continue, the comma operator, go to statement.

Loops: for, while, do-while.

Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifile programs.

Arrays: Linear arrays, multidimensional arrays, Passing arrays to functions, Arrays and strings.

Structure and Union: Definition and differences, self-referential structure. And address of (&) operator, pointer to pointer, Dynamic Momory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.

BSCS201 : Data Structures using C

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered list, Sparse Matrices, and Vector. Stacks: Array Representation and Implementation of stack, Operations and Stacks: Push and POP, Array Representation of Stack, Linked Representation of stack, Operations Associated with Stacks, Application of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, recursion in C.

Queues: Array and linked representation and implementation of queues, Operations on Queue; Create, Add, Delete, Full and Empty, Circular queue, Dequeue, and Priority Queue. Link List: Representation and implementation of Singly linked lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List of Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

Trees: Basic terminology, Binary Tree, Binary tree representation algebraic Expressions, Complete Binary Tree, Extended Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees.

BSCS202 : Computer Based Numerical Techniques

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation. Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, III conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence. Interpolation and approximation: Finite Differences, Difference tables. Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, stirling's Bassel's Everett's formula. Interpolation with unequal intervals: Language's Interpolation, Newton Divided difference formula, Hermite's interpolation Approximation of function by Taylor's series and Chebyshev polynomial.

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapazoidal rule, Simpon's rules, Boole's Rule Euler-Maclaurin Formula Solution of Differential Equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

BSCS203 : System Analysis and Design

System Concepts and Information System Environment: The System Concept, Definition, Characteristics of Systems, Elements of a System, Open and Closed and closed system, Formal & Informal Information Systems, Computer based Information Systems, Management Information System, Decision Support System, General Business Knowledge, and Interpersonal Communicational System.

The System Development Life Cycle: Recognition of needs, Impetus for System Change, Feasibility Study, Analysis, Design, Implementation, Post implementation & Maintenance.

The Role of the Systems Analyst: Historical Perspective, Academic & Personal Qualifications, the multifaceted role of the Analyst, The Analyst/User Interface, Behavioral issues.

Systems Planning & Initial Investigation: Strategies for Determining Information Requirement, Problem Definition & Project initiation, Background Analysis, Fact Analysis, Review of Written Documents, Onsite Observations, Interviews & Questionnaires, Fact Analysis, Performance Analysis, Efficiency Analysis, Service Analysis.

Information Gathering: Kind of Information needed. Information about the firms, Information gathering tools, the art of Interviewing, Arranging the Interview, Guides to Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.

The Tools of Structured Analysis: The Dataflow Diagram (DFD), Data Dictionary, Decision Trees and Structured English.

Feasibility Study: System performance, Economic Feasibility, Technical Feasibility, Behavioral Feasibility, Steps in Feasibility Analysis.

Input/Output and Forms Design: Input Design, CRT Screen Design, Output Design, Requirements form Design.

BSCS204 : Operating System

Operating system- definition, simple batch system, Time sharing system, Real time system, storage hierarchy, operating system service.

Process concept, process Scheduling, operating on process, co-operating process.

CPU Scheduling concepts, Scheduling algorithms, process synchronization, critical section problem, synchronization hardware, semaphores.

Deadlocks, deadlock characterization, deadlock prevention, avoidance detection and recovery.

Storage management Resident monitor, Logical versus physical address space, swapping, and segmentation, SCM.

Virtual memory, Demand paging, page replacement and page replacement algorithms, allocation of frames, thrashing.

File System: File supports, access methods, allocation methods-contiguous, linked and index allocation, directory system – single level, tree structured, acyclic graph and general graph directory, file protection.

Secondary storage structure: Disk structures, disk scheduling disk management, allocation methods, free space management.

BSCS301 : Data Communication & Networks

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer transmission, switching methods, Integrated services digital networks, terminal handling.

Medium Access sub Layer: Channel allocations, LAN protocols, ALOHA Protocols-Pure Aloha, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI, Data Linked Layer elementary data link protocols, sliding windows protocols, error handling, High Level Data Link Control.

Network Layer: Point-to Point networks, routing algorithms, congestion control algorithms, internetworking, TCP/IP packet, IP addresses, Ipv6.

Transport Layer: Design issues, connection management, TCP window Management, User Datagram Protocol, Transmission Control Protocol.

Application Layer: Network Security, Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol.

BSCS302 : Probability & Statistical Techniques

Data representation, Histogram, frequency distribution, Ogive, Arithmetic mean and Geometric Mean, Harmonic Mean, Medium quadrates.

Probability Theory: Sample space & events, the axioms of probability, some elementary theorem, conditional probability, Baye's Theorem, mathematical expectation.

Probability distribution: random variables, binomial distribution, hyper geometric distribution, chebyshev distribution, Poisson distribution, geometric distribution, Erlang distribution.

Probability Densities: continuous random variables, normal distribution, uniform distribution.

Example of Least square, fitting of curves. Correlation and regression.

Theory of Sampling: Sampling, sampling of attributes, Mean of standard deviation of sample, Sampling distribution, Distribution of the means.

Chi square test as a goodness of fit, Chi square test as test of independence.

BSCS303 : Web Programming

History of the web, Growth of the Web, Protocols governing the web, Introduction to Cyber Laws in India, Introduction to International Cyber laws, Web project, Web Team, Team dynamics.

Communication Issues, the client, Multi-departmental & Large scale Websites, Quality Assurance and testing, Technological advances and Impact on Web Teams.

HTML: Formatting Tags, Links, List, Tables, Frames, forms, Comments in HTML, DHTML. Java Script: Introduction, Documents, Documents, forms, statements, functions, objects in Java Script, Events and Event Handling, Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.

XML: Introduction, Display and XML Documents, Data Interchange with an XML document, Document types definitions, Parsers using XML, Client-side usage, Server Side usage.

Common Gateway Interface (CGI), PERL, RMI, COM/DCOM, VBScript, Active Server Pages (ASP).

BSCS304: Basics of Object Oriented Programming

Object-Oriented Analysis and Data Modeling : Object Oriented Concepts, Object oriented Analysis Modeling, Data Modeling.

Object-Oriented Design : Origins of object-Oriented Design, Object Oriented design concepts, Object Oriented Design methods, class and object definition, Refining Operations, Program Components and Interfaces, Annotation for object-oriented Design, Implementation of Detail Design, An alternative object-oriented Design Strategy Integrating OOD with SA/SD.

Introduction to OOP : Advantages of OOP, Need of object Oriented design conepts, Object Oriented Design methods, class and object definition, Refining Operations, Program, Components and Interfaces, Annotation for object-oriented Design, Implementation of Detail Design, An alternative object-oriented Design Strategy, Integrating OOD with SA/SD.

BSCS401 : Software Engineering

Introduction: Introduction to software engineering, Importance of software, evolving role of software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software engineering problems, Software Development Life Cycle, Software Process.

Software Requirement Specification: Analysis, Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control.

Software-Design: Design principles, problem partitioning, abstraction, top down and bottom up-design, Structured approach functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesiveness, coupling, Forth generation techniques, Functional independence, Software Architecture, Transaction and Transaction and Transform Mapping, Component level Design, Forth Generation Techniques.

Coding: Top-Down and Bottom-Up programming, structured programming, information hiding, programming style and internal documentation.

Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification and validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging.

Software Project Management: The Management spectrum (The people, the product, the process, the project) Cost estimation, project scheduling, staffing, software configuration management, Structured Vs. Unstructured maintenance, quality assurance, project monitoring, risk management.

Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 Certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM. CASE (Computer Aided Software Engineering): CASE and its scope, CASE support in software life cycle, documentation, project management, internal interface, Reverse Software Engineering, Architecture of CASE environment.

BSCS402 : RDBMS

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DMI, Overall Database structure. Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Relational Data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joints, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters.

Database Design & Normalization: Functional dependencies, normal forms, first, second third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design

Transaction Processing Concepts: Transaction system, Testing of seralizability, Seralizability of schedules, conflict and view seralizable schedule, recoverability, Recovery form transaction failures, deadlock handling .

BSCS403 : Programming in C++

Introduction to OOP and C++ : Advantages of OOP, Need of object-oriented programming, characteristics of object-oriented languages, C++ and C.

C++ Programming Basics : Basic program construction, input/output using cin/count; Preprocessor Directives; Comments, integer, character, float data types manipulators Arithmetics operators; Library functions.

Loops and Decisions : Relational operators, Loops, Decisions, Logical Operators, Precedence, Control statements.

Structure and Functions : Structure, Enumerated Data Types, simple functions, Passing arguments to and returning values from functions, Reference Arguments. Overloaded functions, Inline functions, Default Arguments, Variable and Storage classes, Returning by reference.

Objects and classes : Specifying & using class & object, Constructors, objects as function arguments.

Arrays and Operator Overloading : Array Fundamentals, Arrays as class member data, Arrays of objects, strings, overloading Unray & Binary operators, Data conversion, Pitfalls of overloading & Conversion.

Inheritance : Derived class and their constructs, overriding member functions, class hierarchies, Public & Private Inheritance, Inheritance levels.

Pointers : Pointers with Arrays, functions, strings, pointer to objects, new-delete, Linked-Lists Virtual Functions, files and Streams : Virtual, friend and static function; the this pointer ; streams; string, character, object I/O; I/O with Multiple objects; File pointers; Disk I/O with member function; Error Handling; Redirection; ;command-line Arguments.

BSCS404 : Theory of Computation
A brief review of Finite Automata, Regular expressions, Regular languages, Deterministic and non-deterministic computations. Pumping Lemma for Regular languages, Context free languages, Pushdown automaton, Pumping Lemma for Context free languages, Grammar types and Chomsky Hierarchy. Turing Machines (TM), Variations of TM's, Universal Turing Machines (UTM), Church-Turing Thesis, Relation of Languages to Automata. Turing computable functions, Halting problem, Solvability, Undecidability and Computability.

BSCS501 : Introduction to Network Security

Introduction To security: Attacks, Services & Mechanisms, Security, Attacks, Security Services, Conventional Encryption: Classical Techniques, Conventional Encryption Model, and steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operations.

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, CR2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement of Encryption Function.

Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Function Birthday Attacks, Security of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signature, Authentication Protocol, Digital Signature Standard (DDS) Proof of Digital Signature Algorithm.

Network & System Security: Authentication Applications: Kerberos X-509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP),S/Mine Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management.

BSCS502 : Visual Basic

Introduction : What is Visual basic; Features of Visual Basic; Visual basic Editions; The Visual Basic Philosophy; The Controls; The Properties; Events; Methods; Developing an Application; Design the User Interface; Write Code to Respond to User Input/Events
Creating an Application : The Tool Box; Project Explorer; The Properties Window; The Form Window; Saving the Project; Understanding Projects; What does Visual Basic 6 have for you to create applications; Customizing this Toolbar; Text Box Control; The Picture Box; Label Box; Option Button; Frame; List Box; Combo Box; Data; Command Button; Check Box; The Drive, Directory and File List Controls; The Line and Shape Controls; The Image Control; OLE(Object Linking and Embedding); Other Tools for Software Development; Menu Bar; Context Menus; Tool Bars; Tool Box; Project Explorer Window; Properties Window; Object Browser; Form Designer; Code Editor Window; Form Layout Window; Immediate, Locals, and Watch Windows IDE, Forms and Controls : The Form; The Anatomy of a Form; Setting Form Properties; Working with the Properties Window; Name; Caption; Picture; Background Color; The Control Box; Min Button and Max Button; Movable; Border Style; Font Properties; Form Methods; Move; Graphic Methods; Show Methods; Initialize; Load; Activate; Deactivate; Unload Event; Terminate; Show Method; Show Style; Hide Method; How Do You Put or Create the Control on

the Form; Working with a Control; More work on a Control; The Code Window; Opening the Code Window; Anatomy of the Code Window; Now Entering the Code.

Variables: What is a Variable; Declaring variables; Data Types; The Null Value; The error Value; The Empty Value; The Scope of a Variable; Module Level Variable; Declaring Variable; Constants; Circular References; Converting Data Types; Arrays, How do you Define them; Declaring Fixed-Size Arrays; Multi-dimensional arrays; Dynamic arrays; The Preserve Keyword.

Writing Code in Visual Basic : The Code Window; Opening the Code Window; Parts of the Code Window; Object Box; Procedures/Events Box; Split Bar; Margin Indicator Bar; Procedure View Icon; Full Module View Icon; The Procedure Separator; The Anatomy of a Procedure; Subroutine or Function; Editor Features; Automatic Word Completion; Auto List Members; Color Cueing; Line Continuation Character; Commenting and Uncomment Statements; The For. Next Statement; The Decision Maker. If; The Loop; The While Loop; Select Case…End Select

Menus : Building the User Interface. The First Step; Overcrowding; Important Information Must be Given Prominence; Consistency; The Fonts; Consistency Across Forms and the Application; Affordances; Simplicity; Usability; Images; Colors; Interacting With the user; All about Menus; The Menu system; Menu Conventions; The Menu Editor; Using the Menu Editor; Making the Menu Better; Coding the Menu Items; Adding the Toolbar; Toolbar Conventions; Pasting Icons on Buttons

Multiple Document Interface Applications : Why MDI Forms; Features of an MDI Form; Loading MDI Forms and Child Forms; The Active Form Property; Changing the Caption of the New Forms; Listing Open Forms; Saving your work; Specifying the Active Child Form or Control; Maintaining State Information for a Child Form; Unloading MDI Forms with Query Unload

Additional Controls Available in Visual Basic 6.0 : Objectives; The Image List control; Working with the Image List Control; Adding Images to the Image List; Tab strip Control; Creating Tabs at Design Time or Run Time; Associating the Image List Control with the Tab Strip Control; MSFlexGrid Control; The Status Bar Control; The Panel Object and the Panels Collection; Tree View Control; Creating a Tree View control; Working with the Tree View control; Displaying Data from a Database; Populating the Tree View control; Slider Control;

ActiveX Data Objects : Objectives; Why ADO; OLE DB; ADO; Establishing a Reference; The Data Source; The ODBC Data Source Administrator; Using the Data Source name in Our Control; Table or Stored Procedure; Using Bound Controls; Updating the data in the Data Source; What is a Cursor

Crystal and Data Reports : Crystal Reports; Prerequisites for working with Crystal reports; Creating a Report through a Wizard; Creating a Report without a Wizard; The Design/Preview Window; Data Report; Getting acquainted with the Data Report Designer; Parts of the Data Report; Data Report Controls; Extracting the Data; Creating Multiple Reports

BSCS503 : Computer Based Operation research techniques

Introduction to O.R.:- definition, Uses and Limitations of Optimization method.

The Linear Programming Problem(LPP) : – Introduction, Formulation of LPP, Graphical solution and some exceptional cases.

The Simplex Method:- solution of LPP by Simplex method, exceptional cases, Artificial variable Techniques (Big M), Two phase of Simplex Method, Problem of Degeneracy.

Dual Simplex Method: - Dual and Primal Problem, Duality and Simplex Method, Solution of LPP Using Revised Simplex Method.

Special types of Linear programming problems – Transportation Problem:- Standard Transportation problem,Balanced Transportation Problem, VAM Method, Degeneracy in transportation problem, Assignment problems and its solution by Hungarian Method.

Integer Programming :- Introduction, Branch and Bound techniques.Binary Linera Programming.

Dynamic programming : Basic concepts, Bellman's optimality principles of D.P. models and computations.

Queuing Models: Notations and assumptions, Elements and characteristics of Queing systems, measurement of system performance,Queing Models: Basic single channel Model, Multiple channel model, other queing models: Poisson arrival rate with any service distribution, finite queue length, Multiple server, priority servicing model.

BSCS504 : E-Governance

Introduction: E-Governance - Technology and Prospects, Definition of E-Governance, Economic potential of E-Governance, Incentives for engaging in E-Governance, forces behind E-Governance, Advantages and Disadvantages, Architectural framework, Impact of E-Governance.

Network Infrastructure of E-Governance: Internet based E-Governance Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY).

Mobile Commerce: Introduction, Wireless Application Protocol, WAP Technology, Mobile Information device, Mobile Computing Applications.

Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

Encryption: Encryption techniques, Symmetric Encryption-Keys and data encryption standard, Triple encryption. Asymmetric encryption-Secret key encryption, public and private pair key encryption, Digital Signature, Virtual Private Network.

Electronic Payments: Overview, The SET protocol, payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking EDI Application in business, E-Commerce Law, Forms of Agreement, Govt. policies and Agenda.

BSCS601 : Multimedia Application

Multimedia Input Devices: Scanner, Digital Camera, Microphone, Video Camera.

Multimedia Output Devices: Sound/Speaker, colour Monitors, Printers

Storage Devices: CD-ROM's, DVD – Digital Versatile Disk, Coding & Compression Formats for Image, Audio, Video

Nonlinear form of Presentation: Hypertext, Hypermedia, Human/Computer Interaction

Cognitive Aspects of Information Transfer: Various Models of Structuring of Content Methodology for developing Multimedia CDROM Titles.

Use of Multimedia tools: PhotoShop, Sound Editor, Video Editor, Animator, Authorizing tool – Director Multimedia Databases, Multimedia Application in Education, Libraries, Publishing, Art & Culture, Medicine and Industry.

BSCS602 : Computer Graphics

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display Plotters, Printers. Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Input Techniques: Positioning techniques, Potentiometers, Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points defining a boundary rectangle, multiple selections, Menu selection.

Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

Line Drawing Algorithms: DDA Algorithms, Bresenham's Line algorithm.

Segment & Display files: Segments, Functions for segmenting the display file, Posting and posting a segment, segment naming schemes, Default error conditions, Appending to

segments, Refresh concurrent with reconstruction, Free storage allocation, Display file structure.

Graphics Operations: Clipping, Point Clipping, Line Clipping, Polygon Clipping. Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, superellipsoid, Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems. 3D Graphics: 3D Display Methods, 3D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal.